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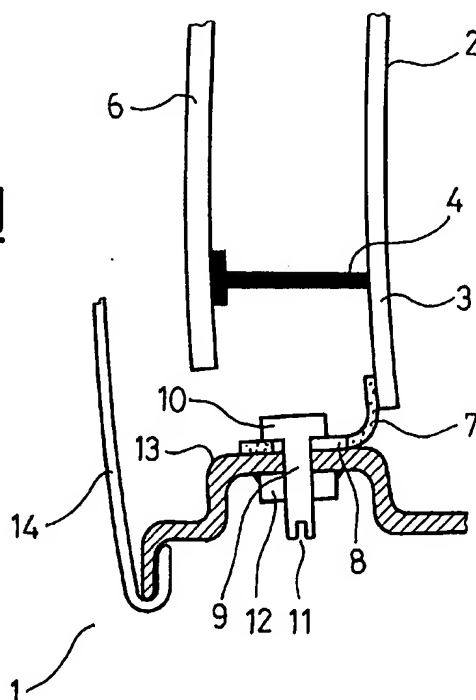
(54) Cabriolet door with adjustable window regulator rail and corresponding method of assembly

(57) The invention proposes a method for assembling a window regulator in a vehicle door (1). This method comprises the steps of inserting a screw (9) with two heads (10, 11) into the screw thread of a plate (13) secured to an outer panel (14) of the door. The screw passes through an elongated hole in a lug substantially perpendicular to a slider guide of a window regulator rail. The transverse position of the rail with respect to the

screw is adjusted. The screw is tightened using its upper head. The screw is loosened later using the lower screw head. The adjustment of the transverse position of the rail is then tweaked and the screw is tightened again using the lower screw head.

The invention makes it possible to assemble the window regulator and adjust its position from the inside (coarse adjustment) and the underside (final adjustment) of the door.

FIG\_1



## Description

**[0001]** The invention relates to car doors and window regulators particularly to doors and window regulators of cabriolets.

**[0002]** Cabriolets are known, in particular the Peugeot 206CC, in which the door has no window frame. In this case, it is then particularly important to adjust the position of the top of the window in the transverse direction of the vehicle.

**[0003]** The Peugeot 206CC has a door window regulator with a rail that is adjustable in the transverse direction. The window regulator comprises two rails running vertically inside a front door. These rails have a slider guide groove. A lug is fixed to the lower part of the rail. This lug forms approximately an angle of about 90° with respect to the rail and thus projects in the transverse direction of the vehicle. A screw is welded to this lug. A bridging piece is arranged against a lower sheet metal return of the door or of the chassis. The return has an opening for accessing the bridging piece. The bridging piece has an elongated hole running in the transverse direction of the vehicle. The screw passes through the elongated hole and is fixed by a nut to the bridging piece. During assembly on a production line, the nut is fitted and tightened from the underside of the door. As far as the operator is concerned, this is a tricky and not very ergonomic way of fitting the nut.

**[0004]** US-A-3 844 064 discloses a guiding mechanism for slidable curved window panes of automotive vehicles, which involves a transversally mounted adjusting screw for effecting adjustable final positioning of the guide rail. The adjusting screw is visible and therefore accessible from the inside of the vehicle, which may cause an accidental manipulation from the user.

**[0005]** US-A-4 956 942 discloses several window adjustment apparatuses, wherein the lower end of the guide channel is remotely controlled, requiring thereby the embodiment of an additional housing and an adjustment member.

**[0006]** Both US-A-5 960 588 and US-A-6 5 632 121 describe adjusting devices for automobile window panes, wherein the transverse positioning of the window pane is effected by means of bolted connections. These fastening elements are accessible only from the underside of the door body, the manipulation of which is not easy nor very ergonomic.

**[0007]** A still further means is known from WO-A- 98 16709, which proposes making use of a coarse and a fine adjust bolts for the coarse and fine adjustment steps, respectively. The operator is therefore required to manipulate two separate bolts on two different locations.

**[0008]** US-A-3 273 285 discusses a window regulator mechanism for positioning a window glass member in the course of its vertical movement.

**[0009]** There is therefore a requirement for a window regulator, which solves one or more of the problems

mentioned above.

**[0010]** In an embodiment of the invention, a window regulator assembly comprises: a window regulator having a slider guide rail, a surface substantially perpendicular to the guide rail, an elongated hole being provided in the surface; a panel with a plate fixed with respect to the panel, said plate having a screw thread; a screw having a first and a second end, a first and second drive heads at said first and second ends, one head of the screw being adapted to pass through said elongated hole and through said screw thread; wherein the screw passes through the elongated hole and is engaged into the screw thread.

**[0011]** In another embodiment, the panel is an outer panel of a vehicle door.

**[0012]** In yet another embodiment, one head of the screw is accessible from the underside of the vehicle door.

**[0013]** In yet another embodiment, another head of the screw is accessible from the inside of the vehicle door.

**[0014]** In yet another embodiment, the screw is substantially vertical.

**[0015]** The invention also provides a kit of parts comprising a window regulator having a slider guide rail, a surface substantially perpendicular to the guide rail, an elongated hole being provided in the surface; a screw having a first and a second end, a first and second drive heads at said first and second ends, one head of the screw being adapted to pass through said elongated hole.

**[0016]** The invention further provides a method for mounting a window regulator in a vehicle door, the window regulator having a slider guide rail, a surface substantially perpendicular to the guide rail, an elongated hole being provided in the surface; the vehicle door comprising a panel with a plate fixed with respect to the panel, said plate having a screw thread; the method comprising the steps of: inserting one head of a screw through said elongated hole, said screw having a first and a second end with a first and second drive heads at said first and second ends; engaging said screw into said screw thread; adjusting the transverse position of the rail with respect to said screw; tightening the screw into said screw thread.

**[0017]** In another embodiment, the step of the inserting is carried out from the inside of the vehicle door.

**[0018]** The invention also provides a method for a fine adjustment of the position of a window regulator in an assembly as described hereinabove, the method comprising the steps of: loosening the screw from the lower of said screw heads; tweaking the adjustment of the transverse position of the rail with respect to the screw and tightening the screw from the lower of said screw heads.

**[0019]** In another embodiment, the steps of loosening and tightening are carried out from the underside of the vehicle door.

**[0020]** Other features and advantages of the invention will become apparent from reading the description which follows of some embodiments of the invention, which is given by way of example and with reference to the appended drawings which show:

Figure 1 a view in cross section of a part of a door according to the invention;

Figure 2 a view in longitudinal section of the door of Figure 1.

**[0021]** The invention proposes to assemble a window regulator rail on a door or a chassis by means of a vertical two-headed screw. The upper head is used to carry out a first adjustment of the transverse position of the rail. The lower head is used to tweak the adjustment of the transverse position of the rail.

**[0022]** In the description which follows, the transverse direction corresponds to the normal to the mean plane of the door or of a lateral bodywork panel as appropriate.

**[0023]** Figures 1 and 2 show a door 1 comprising a window regulator rail 2 according to the invention. The window regulator rail 2 has a slider guide 3. The slider 4 slides in this guide, which may, for example, be produced in the form of a slot 5. The guide allows the slider to slide during the upward or downward travel of the slider 4. The slider 4 is secured to a window 6. The rail has a lug 7 which is arranged approximately at right angles to the guide 3.

**[0024]** The lug 7 has an elongated hole 8 extending in the transverse direction of the door or chassis as appropriate. A double-headed screw 9 is inserted into the elongated hole 8. The screw has an upper head 10 and a lower head 11. The screw thread of the screw is inserted in a screw thread of a corresponding nut 12. The nut 12 is fixed by welding to a bridging piece 13. The bridging piece is preferably produced in the bottom of the door, in the region where the lower end of the rail is to be situated. The nut is fixed to a flat surface or to a plate of the bridging piece 13.

**[0025]** The lug 7 may for example be produced in a fold of sheet metal of the guide rail or using an attached and welded part, as appropriate. The upper surface of the lug forms a bearing surface for the upper screw head 10, so that this screw head can apply a compressive force to the lug. The lower surface of the lug forms a bearing surface to come into contact with a corresponding surface of the bridging piece 13.

**[0026]** The elongated hole 8 allows the guide to be slid transversely with respect to the screw during adjustment. Thus, when the screw is held in place without being tightened, the lug is free to slide to set the transverse position of the rail with respect to the outer panel. The transverse position of the window can consequently be modified in this way.

**[0027]** When a tightening force is applied between the screw 9 and the nut 12, the contacting surfaces belonging respectively to the bridging piece and to the lug are

immobilised by friction. It is also possible to anticipate immobilising the surfaces of the bridging piece and of the lug respectively using appropriate stops if the friction force between the bridging piece and the lug proves to be insufficient.

**[0028]** The screw is preferably arranged substantially vertically in the door. Thus, access to its two heads is easier. The screw has screw heads 10 and 11 which are suited to being turned using a corresponding tool. The upper screw head allows installation and tightening from above, which is ergonomic and accordingly reduces the time taken to fit and to tighten the screw. It is, for example, possible to use a hexagonal upper head to make it easier to grip from a distance. This is because the screw is generally arranged at the bottom of the door at the time of assembly of the rail to the door and it is desirable to make it easier to grip. The lower screw head is used for tightening of loosening from the bottom. Thus, when auxiliary parts of the door have been fitted, such as a window, enclosures, a lock or a protective inner panel, while the upper screw head is difficult to access, access to the lower screw head is still easy so that the transverse position of the window can be adjusted again if necessary, for example in the event of impact. Furthermore, it is preferable to use a lower head of the "headless" type. This head can thus pass through the screw thread of the nut 9. A standard driving recess shape, of the slotted, hexagonal or torx type is preferably chosen, which shapes can be operated using a standard tool.

**[0029]** In the example of Figures 1 and 2, the lower screw head opens at the bottom outside of the door. There is thus good access for more precise adjustment once the auxiliary door parts have been fitted. The lower screw head preferably opens into a lower recess of the door. The screw head thus remains fairly unnoticeable to the user. The plate and the recess are then preferably produced in the form of a bridging piece, for example by bending or pressing a metal sheet.

**[0030]** The invention also relates to a method of assembling a door. The screw thread of the screw is inserted into the screw thread of the bridging piece or into the nut, arranging the lower screw head downward. The transverse position of the screw in the elongated hole is adjusted, for example on a mass-production door assembly line. The screw is tightened using the upper screw head. Next, the screw is loosened using the lower screw head. The adjustment of the transverse position of the screw in the elongated hole is tweaked, for example at the end of the door assembly line when most of the auxiliary door parts have been assembled. The screw is then tightened to immobilise the transverse position of the screw in the elongated hole and therefore the transverse position of the window and of the rail with respect to the outer panel. The transverse position of the screw in the elongated hole has a great influence on the transverse position of the top of the window. This tightening is performed using the lower screw head.

**[0031]** Of course, the present invention is not restrict-

ed to the examples and embodiments described and depicted but can be varied in numerous ways accessible to the person skilled in the art. Thus, although a nut attached and welded to the bridging piece has been described herein-above, it is just as possible to use any other appropriate means such as a screw thread produced directly in the thickness of the bridging piece. Furthermore, although the invention has been described mainly in the case of a mounting in a door, the invention applies also to the mounting of this window regulator for the rear seats in a chassis which has no rear doors.

## Claims

### 1. A window regulator assembly comprising:

- a window regulator having a slider guide rail (3), a surface (7) substantially perpendicular to the guide rail, an elongated hole (8) being provided in the surface;
- a panel (14) with a plate (13) fixed with respect to the panel, said plate having a screw thread (12);
- a screw (9) having a first and a second end, a first and second drive heads (10, 11) at said first and second ends, one head of the screw (11) being adapted to pass through said elongated hole and through said screw thread (12);

wherein the screw passes through the elongated hole and is engaged into the screw thread (12).

### 2. The assembly of claim 1, wherein the panel is an outer panel of a vehicle door (1).

### 3. The assembly of claim 2, wherein one head of the screw (9) is accessible from the underside of the vehicle door.

### 4. The assembly of claim 2 or 3, wherein another head of the screw (9) is accessible from the inside of the vehicle door.

### 5. The assembly of one of claims 1 to 4, wherein the screw (9) is substantially vertical.

### 6. A kit of parts comprising:

- a window regulator having a slider guide rail (3), a surface (7) substantially perpendicular to the guide rail, an elongated hole (8) being provided in the surface;
- a screw (9) having a first and a second end, a first and second drive heads (10, 11) at said first and second ends, one head of the screw being adapted to pass through said elongated hole.

### 7. A method for mounting a window regulator in a vehicle door, the window regulator having a slider guide rail (3), a surface (7) substantially perpendicular to the guide rail, an elongated hole (8) being provided in the surface; the vehicle door comprising a panel (14) with a plate (13) fixed with respect to the panel, said plate having a screw thread (12); the method comprising the steps of:

- inserting one head (11) of a screw (9) through said elongated hole (8), said screw (9) having a first and a second end with a first and second drive heads (10, 11) at said first and second ends;
- engaging said screw (9) into said screw thread (12);
- adjusting the transverse position of the surface (7) with respect to said screw (9);
- tightening the screw (9) into said screw thread (12).

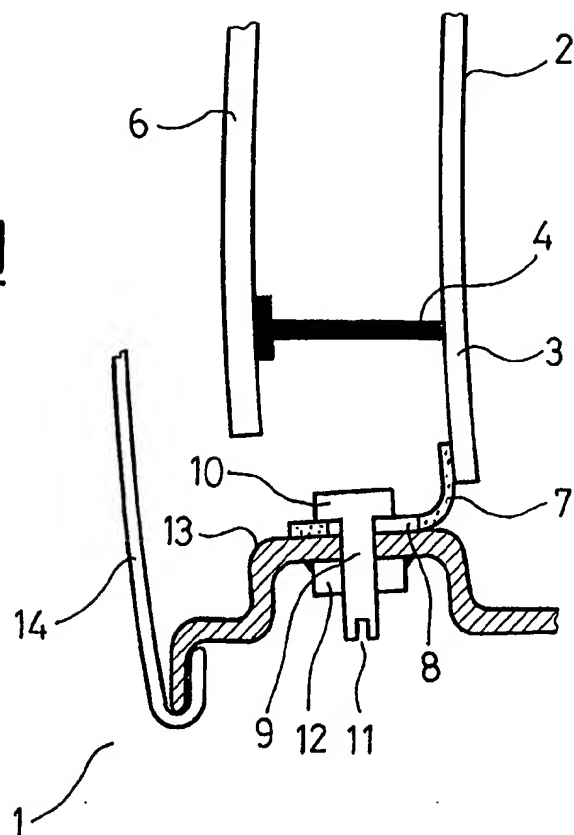
### 8. The method of claim 7, wherein the step of the inserting is carried out from the inside of the vehicle door.

### 9. A method for a fine adjustment of the position of a window regulator in an assembly according to one of claims 1 to 5, the method comprising the steps of:

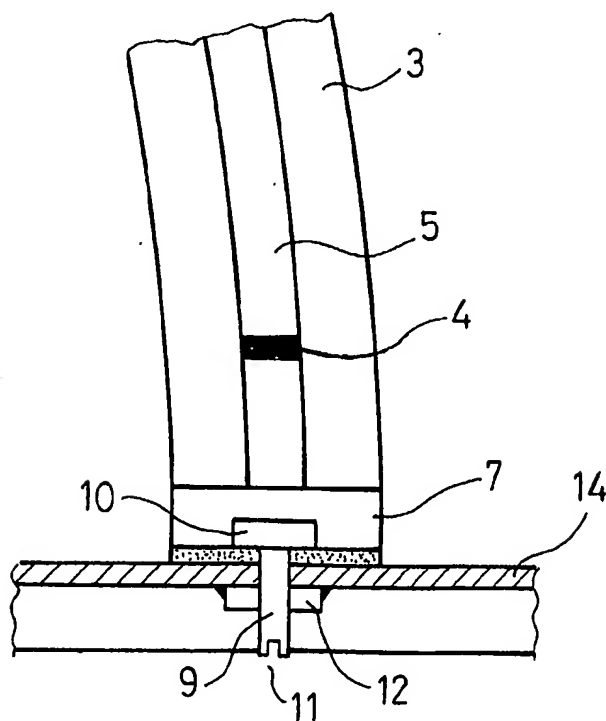
- loosening the screw (9) from the lower of said screw heads;
- fine adjusting the transverse position of the surface (7) with respect to the screw (9);
- tightening the screw (9) from the lower of said screw heads.

### 10. The method of claim 9, wherein the steps of loosening and tightening are carried out from the underside of the vehicle door.

FIG\_1



FIG\_2





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## EUROPEAN SEARCH REPORT

Application Number  
EP 02 29 2146

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Place of search		Date of completion of the search	Examiner
THE HAGUE		13 December 2002	Vanneste, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 02 29 2146

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